Badlands National Park,
Accuracy Assessment Metadata

Identification_Information:
Citation:
Citation_Information:
Originator:
Remote Sensing and GIS Group, Technical Service Center, US Bureau of Reclamation, Mail Code D-8260, POB 25007, Denver CO 80225
Publication_Date: 1999
Title: Badlands National Park Accuracy Assessment Data
Geospatial_Data_Presentation_Form: Table
Series_Information:
Series_Name: USGS-NPS Vegetation Mapping Program
Issue_Identification: Badlands National Park
Publication_Information:
Publication_Place: Denver, CO
Publisher: USGS-BRD
Other_Citation_Details: Created under contract to the USGS-BRD-CBI
Online_Linkage: http://biology.usgs.gov/npsveg/badl/index.html#accuracy_assessment_info
Description:
Abstract:
This metadata is for the accuracy assessment data associated with the vegetation land cover and land use geospatial database for Badlands National Park and surrounding areas. The project is authorized as part of the USGS/NPS Vegetation Mapping Program (http://biology.usgs.gov/npsveg). The program is being administered by the Biological Resources Division (BRD) of the United States Geological Survey (USGS). The USGS/BRD is responsible for overall management and oversight of all ongoing mapping efforts. This mapping effort was performed by the US Bureau of Reclamation's (USBR) Remote Sensing and GIS Group, Technical Service Center, Denver, CO. The vegetation mapping program is part of a larger Inventory and Monitoring (I&M) program started by the National Park Service (NPS) Their website is : http://www1.nature.nps.gov/im/
Purpose:
The purposes of the mapping effort are varied and include the following: Provides support for NPS Resources Management; Promotes vegetation-related research for both NPS and USGS/BRD; Provides support for NPS Planning and Compliance; Adds to the information base for NPS Interpretation; and Assists in NPS Operations. The NPS I&M goals are, among others, to map the vegetation of all national parks and monuments and provide a baseline inventory of vegetation.
Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 199808
Currentness_Reference:
From the USGS-NPS Vegetation Mapping Program Badlands National Park, South Dakota Procedure Report, November 19, 1999. See: http://biology.usgs.gov/npsveg/badl/report.pdf#accuracy
Status:
Progress: Complete
Maintenance_and_Update_Frequency: None Planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -102.943
East_Bounding_Coordinate: -101.817
North_Bounding_Coordinate: 44
South_Bounding_Coordinate: 43.432
Description_of_Geographic_Extent:

Badlands National Park, SD including approx 5 mile buffer around park which includes private lands, portions of Buffalo Gap National Grassland, and Pine Ridge Indian Reservation.

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Land cover
Theme_Keyword: Land use
Theme_Keyword: Vegetation
Theme_Keyword: National Park Service
Theme_Keyword: Accuracy Assessment
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: South Dakota
Place_Keyword: Badlands National Park
Place_Keyword: Pine Ridge Indian Reservation
Place_Keyword: Red Shirt
Place_Keyword: Scenic
Place_Keyword: Cheyenne River
Place_Keyword: Buffalo Gap National Grassland
Place_Keyword: Badlands Wilderness Area
Place_Keyword: White River
Place_Keyword: Interior
Access_Constraints: None
Use_Constraints:
Acknowledgment of the USGS/BRD, National Park Service, and the USBR/RSGIS Group would be appreciated in products derived from these data. Any person using the information presented here should fully understand the data collection and compilation procedures, as described in the metadata, before beginning analysis. The burden for determining fitness for use lies entirely with the user.
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: USGS-NPS Vegetation Mapping Program Coordinator
Contact_Organization: Center for Biological Informatics, USGS-BRD
Contact_Address:
Address_Type: Mailing Address
Address: PO Box 25046, MS-302
City: Denver
State_or_Province: Colorado
Postal_Code: 80225
Contact_Voice_Telephone: (303) 202-4220
Contact_Facsimile_Telephone: 303-202-4229
Contact_Facsimile_Telephone: 303-202-4219 (org)
Contact_Electronic_Mail_Address: gs-b-npsveg@usgs.gov
Browse_Graphic:
Browse_Graphic_File_Name: http://biology.usgs.gov/npsveg/badl/images/badlaa.jpg
Browse_Graphic_File_Description: 213 Kbyte
Browse_Graphic_File_Type: JPEG
Data_Set_Credit:
Dan Cogan, Doug Crawford, Trudy Meyer, Jean Pennell & Jim Von Loh with RSGIS Group of USBR; Jim Drake of TNC; Bruce Bessken and Glenn Plumb of Badlands NP, NPS
Native_Data_Set_Environment: Microsoft Excel
Taxonomy:
Keywords/Taxon:
Taxonomic_Keyword_Thesaurus: None
Taxonomic_Keywords: Plants
Taxonomic_Keywords: Vegetation

Taxonomic_Keywords: National Vegetation Classification System
Taxonomic_Classification:
Taxon_Rank_Name: Kingdom
Taxon_Rank_Value: Plantae
Applicable_Common_Name: Plant
Taxonomic_Classification:
Taxon_Rank_Name: Division-Phylum
Taxon_Rank_Value: Tracheophyta
Taxonomic_Classification:
Taxon_Rank_Name: Class
Taxon_Rank_Value: Angiospermai
Taxonomic_Classification:
Taxon_Rank_Name: Class
Taxon_Rank_Value: Gymnospermae

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Overall, initial accuracy of the vegetation map is 80.6% for all vegetation classes and the Kappa Index is 78.2%. Results for each vegetation class are discussed here, and recommendations are made relative to creating a more accurate vegetation map, as desired.

The specific results are presented in Tables 5 and 6 in the "USGS-NPS Vegetation Mapping Program, Badlands National Park, South Dakota Methodology Report" (http://biology.usgs.gov/npsveg/badl/report.pdf#assessment). In general, the percentage of the Park that an individual map class covered is reflected in the number of AA points collected for that type. For example, map class 16-19 (Western Wheatgrass Alliance / Western Wheatgrass - Green Needlegrass Grassland) covers approximately 38% of the Park, and is represented by 29% of the AA points, and map Class 1 (Prairie Dog Town Complex) occupies approximately 2% of the Park and is represented by 3% of the AA points. An exception for this is map class 2 (Badlands Sparse Vegetation Complex), which covers approximately 46% of the Park but is represented by only 14% of the AA points.

Two rare shrub classes were either not assessed or lightly assessed, due to their lack of abundance within the Park. These include map class 33 (Rabbitbrush Shrubland), which was not assessed and map class 38 (Sandbar Willow Temporarily Flooded Shrubland), which had one AA point but the polygon was attributed with a land use type; map class 56 (intermittent stream).
Logical_Consistency_Report: Unknown
Completeness_Report:
AA data, including limited habitat and vegetation data, was recorded on field forms to document the classification decision made by the investigator. This form was modified and expanded from previous forms to include fields for additional community types found within 50 meters of the actual assessment point. Modifications were made to help accommodate several types of difficult situations, such as AA points located in small inclusions, heterogeneous polygons/stands, and GPS PLGR error.

465 AA data points were collected during August 1998. The weather at this time was unusually warm and vegetation readily identifiable unless heavily grazed. In the Park's North Unit, an extremely heavy growth of yellow sweetclover was present over most grassland and shrub communities. While noted during the AA sampling, very little yellow sweetclover was present during the previous year (1997), the year of aerial photography acquisition and interpretation. AA points were collected in proportion to the size of the plant association/ map class within the Park; e.g. more points were collected within extensive types.

All accuracy data points were entered into a digital coverage and overlayed electronically onto final vegetation maps (by DOQQ).
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: The UTM coordinates and elevation of all plots were logged using a hand-held Precision Lightweight Global Positioning System (GPS) Receiver (PLGR) unit.

Lineage:
Process_Step:
Process_Description:
Accuracy assessment of the BADL project area was conducted in September 1999. This involved entering all accuracy data points into a digital coverage and overlaying these electronically onto final vegetation maps (by DOQQ). AA identification numbers plotted alongside each point allowed for comparison with accuracy assessment data forms. A contingency table was set up to record the reference data (collected in the field) versus the sample data (vegetation map) for each map unit.

Errors of commission (i.e. user's errors) for each class were calculated by dividing the number of correctly classified samples by the total number of samples that were classified as belonging to that map class. Errors of omission (i.e. producer's errors) for each class were calculated by dividing the number of samples that were classified correctly by the total number of reference samples in that class. Confidence intervals for each map class were calculated using one of the methods shown in Table 2 (USGS-NPS Vegetation Mapping, Badlands National Park, South Dakota, Methodology Report) depending on the normality and size of the data.

Overall total accuracy for BADL was calculated across all sampled map classes by dividing the number of correctly classified accuracy points by the total number of accuracy points. Confidence intervals for overall total accuracy were calculated using the equation for normally distributed data (see above). A Kappa Index (Foody 1992) was used to help account for any correct classification due to chance.

A total of 458 accuracy assessment points were used to assess the accuracy of the BADL vegetation map by:

using AA points collected during the summer of 1998 (front-loading method);

entering AA point coordinates into an electronic format to overlay on the vegetation map;

comparing map vegetation classification (transferred from photo interpretation) with field assessment of vegetation type to determine errors of omission and commission;

resolving questions by referring to original data forms, so that Dr. Butler could make the final determination; recording all information on the AA matrix.

Overall, initial accuracy of the vegetation map is 80.6% for all vegetation classes and the Kappa Index is 78.2%. Results for each vegetation class are discussed here, and recommendations are made relative to creating a more accurate vegetation map, as desired.

The specific results are presented in Tables 5 and 6 below. In general, the percentage of the Park that an individual map class covered is reflected in the number of AA points collected for that type. For example, map class 16-19 (Western Wheatgrass Alliance / Western Wheatgrass - Green Needlegrass Grassland) covers approximately 38% of the Park, and is represented by 29% of the AA points, and map Class 1 (Prairie Dog Town Complex) occupies approximately 2% of the Park and is represented by 3% of the AA points. An exception for this is map class 2 (Badlands Sparse Vegetation Complex), which covers approximately 46% of the Park but is represented by only 14% of the AA points.

Two rare shrub classes were either not assessed or lightly assessed, due to their lack of abundance within the Park. These include map class 33 (Rabbitbrush Shrubland), which was not assessed and map class 38 (Sandbar Willow Temporarily Flooded Shrubland), which had one AA point but the polygon was attributed with a land use type; map class 56 (intermittent stream).
Process_Date: 199909
Methodology:
Methodology_Type: Field
Methodology_Identifier:
Methodology_Keyword_Thesaurus: None
Methodology_Keyword: front-loading
Methodology_Keyword: Kappa Index

Methodology_Description:
The accuracy assessment (AA) for the BADL vegetation mapping project consisted of preliminary planning and discussion, logistical planning, fieldwork, analysis of fieldwork, and computation of final results. Preliminary planning involved BOR/RSGIG and Dr. Jack Butler (a plant ecologist contracted to collect the field AA data). Following detailed discussion, a modified accuracy assessment procedure dubbed "front-loading" (Owens 1998) was selected using protocols outlined in the Accuracy Assessment Procedures (TNC 1994).

The following guidelines for the AA procedure were adopted at this time:

Observations of vegetation classes were to be ground-based.

Ground sampling techniques were to be similar to the Observation Points collected during initial classification.

The number of samples per plant association/map class would vary depending on abundance of the class upon the landscape.

No maximum number of points was assigned so that the Park could be sampled as completely as possible.

Logistical planning for the AA revolved around coordination of work schedules and finding reasonable work areas within the Park. Collection of AA points was confined to within Park boundaries but not limited to the previously described gradsects. Instead, AA's were based on availability of access and to a lesser extent, time constraints. The actual assessment was begun prior to completion of preliminary vegetation maps for the Park, thus the need for the front-loading of the sample points. Selecting random AA sampling sites beforehand was deemed unnecessary due to familiarity of the principal researcher with vegetation types and distribution at BADL. The final point chosen for assessment was selected to be as representative as possible of the vegetation in the immediate area, well away from stand boundaries, and in a stand larger than the minimum mapping unit (exceptions were made for wetland and some shrub classes which rarely exceeded 0.5 hectares in size). Field ecologists were supplied with a vegetation key, to be used to determine plant associations/map classes entered on field forms.

AA data, including limited habitat and vegetation data, was recorded on field forms to document the classification decision made by the investigator. This form was modified and expanded from previous forms to include fields for additional community types found within 50 meters of the actual assessment point. Modifications were made to help accommodate several types of difficult situations, such as AA points located in small inclusions, heterogeneous polygons/stands, and GPS PLGR error.

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Methodology_Citation:
Citation_Information:
Originator:
Mirjam Stadelmann*
Anthony Curtis*
Randy Vaughan*
Marian Bailey
Charles Convis
Environmental Systems Research Institute, Inc. (ESRI)
380 New York Street
Redlands, CA 92373

Michael Goodchild*
Frank Davis
National Center for Geographic Information Analysis
3510 Phelps Hall
University of California at Santa Barbara
Santa Barbara, CA 93106

Xiaojun Li
Kathy Goodin
Dennis Grossman
The Nature Conservancy
1815 North Lynn Street
Arlington, VA 22207
Publication_Date: 199411
Title:
Accuracy Assessment Procedures,
NBS/NPS Vegetation Mapping Program
Geospatial_Data_Presentation_Form: Report
Publication_Information:
Publication_Place: Denver, Colorado
Publisher: USGS-BRD, Center for Biological Informatics
Other_Citation_Details:
Prepared for:

United States Department of Interior National Biological Survey and National Park Service

Prepared by:

Environmental Systems Research Institute
380 New York Street
Redlands, California 92373

National Center for Geographic Information and Analysis
University of California
3510 Phelps Hall
Santa Barbara, California 93106

The Nature Conservancy
1815 N. Lynn Street
Arlington, Virginia 22209
Online_Linkage: http://biology.usgs.gov/npsveg/aa/aa.html

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Point

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 13
Transverse_Mercator:
Longitude_of_Central_Meridian: -105
Latitude_of_Projection_Origin: 0
False_Easting: 500000

False_Northing: 0
Scale_Factor_at_Central_Meridian: .9996
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 1
Ordinate_Resolution: 1
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodedic Reference System 80
Semi-major_Axis: 6378137
Denominator_of_Flattening_Ratio: 298.257

Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Information collected for Accuracy Assessment included:

Plot Number
Park Code
Date
Observer(s)
Datum
Accuracy
UTM Coordinates: Easting Northing
UTM Zone 9. Offset from Point: Easting (in meters) Northing (in meters)
Topographic Description
Elevation
Aspect
Veg Assoc. at Site
Veg Assoc. 2 within 50m of Site
Veg Assoc. 3 within 50m of Site
Major Species Present (by strata)
Canopy Closure of Top Layer
Rationale for Classification
Comments
Entity_and_Attribute_Detail_Citation:
See:

Accuracy Assessment Field Form:
http://biology.usgs.gov/npsveg/badl/report.pdf#appendix11

Total area (meters 2 / 4046.9 acres/m 2 / 2.471 acres/hectare) and number of
polygons per mapping unit.
http://biology.usgs.gov/npsveg/badl/report.pdf#table5

Summary of AA Results for Badlands National Park, by map class.
http://biology.usgs.gov/npsveg/badl/report.pdf#table6

Contingency table (error matrix) for BADL vegetation mapping accuracy assessment.
http://biology.usgs.gov/npsveg/badl/aa_matrix.pdf

The map codes as described in Appendix 14:
http://biology.usgs.gov/npsveg/badl/codescript.pdf

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: USGS-NPS Vegetation Mapping Program Coordinator
Contact_Organization: Center for Biological Informatics, USGS-BRD
Contact_Address:
Address_Type: Mailing Address
Address: PO Box 25046, MS-302
City: Denver
State_or_Province: Colorado
Postal_Code: 80225
Contact_Voice_Telephone: (303) 202-4220
Contact_Facsimile_Telephone: 303-202-4229
Contact_Facsimile_Telephone: 303-202-4219 (org)
Contact_Electronic_Mail_Address: gs-b-npsveg@usgs.gov
Resource_Description: Badlands National Accuracy Assessment Data
Distribution_Liability:
Although these data have been processed successfully on a computer system at the Biological Resources Division, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that these data are directly acquired from a Biological Resources Division server, and not indirectly through other sources which may have changed the data in some way. It is also strongly recommended that careful attention be paid to the contents of the metadata file associated with these data. The Biological Resources Division shall not be held liable for improper or incorrect use of the data described and/or contained herein.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: HTML
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: http://biology.usgs.gov/npsveg/badl/index.html#accuracy_assessment_info
Fees: None

Metadata_Reference_Information:
Metadata_Date: 200111
Metadata_Review_Date: 20060829
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: USGS-NPS Vegetation Mapping Program Coordinator
Contact_Address:
Address_Type: mailing and physical address
Address:
U.S. Geological Survey, Center for Biological Informatics, MS 302,
Room 8000, Building 810, Denver Federal Center
City: Denver
State_or_Province: Colorado
Postal_Code: 80225
Country: USA
Contact_Voice_Telephone: (303) 202-4220

Contact_Facsimile_Telephone: (303) 202-4219
Contact_Electronic_Mail_Address: gs-b-npsveg@usgs.gov
Metadata_Standard_Name: FGDC-STD-001.1-1999 Content Standard for Digital Geospatial Metadata, 1998 Part 1: Biological Data Profile, 1999
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Extensions:
Online_Linkage: http://biology.usgs.gov/fgdc.bio/bionwext.txt
Profile_Name: Biological Data Profile FGDC-STD-001.1-1999